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Overhead Sign Illumination (Lighting)

I. Introduction

A. Purpose

To modify Washington State Department of Transportation (WSDOT) policies regarding overhead sign lighting.

B. References

Revised Code of Washington (RCW) 47.36.030, Traffic Control Devices

Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD), FHWA, June 2001 Millennium Edition, including the *Washington State Modifications to the MUTCD*, M24-01, 2003

Design Manual, M22-01

Traffic Manual, M51-02

Standard Plans for Road, Bridge, and Municipal Construction (Standard Plans), M21-01

Standard Specifications for Road, Bridge, and Municipal Construction (Standard Specifications), M41-10

C. Background

WSDOT is continuously looking for ways to conduct business more efficiently by using newer technologies to save money and reduce maintenance activities. In the 1990's, the sign retroreflective sheeting industry developed new microprismatic retroreflective sheeting (Types VII, VIII, and IX) that provides greater luminance and legibility than encapsulated retroreflective sheeting (Type III).

D. Discussion

Texas Transportation Institute (TTI) and Ohio Research Institute for Transportation and the Environment (ORITE) conducted research on overhead guide signs.

The TTI study focused exclusively on nighttime legibility. The study compared signs with Type III encapsulated sheeting (legend and background)

versus Type IX microprismatic sheeting (legend) and Type III encapsulated (background). Two test vehicles were used, one with the newer headlamp technology, and one with the older style headlamps. The study showed the overall legibility distance increased when microprismatic sheeting was used.

The ORITE study selected and compared sign-materials sheeting combinations under lighted and unlighted combinations at night to determine if any of the combinations have adequate conspicuity, legibility, and appearance quality to allow the erection of overhead guide signs on freeways with external luminaries. Three test vehicles were used, two with the newer headlamp technology, and one with the older style headlamps. The study concluded that unlighted overhead guide signs with Type VII or IX sheeting (legend) with Type III or IV sheeting (background) provided the same legibility and readability as compared to lighted overhead guide signs with Type III sheeting (legend and background).

The Millennium Edition of the MUTCD requires all regulatory, warning, and guide signs to be retroreflective or illuminated to show the same shape and similar color both day and night. The MUTCD further recommends all overhead signs be illuminated, unless an engineering study identifies that retroreflection will perform effectively without illumination. Since an engineering study for every overhead sign is impracticable, FHWA has proposed the following minimum retroreflectivity levels for unlighted overhead guide signs: 250 cd/lx/m² for legend and 25 cd/lx/m² for background.

The following sheeting types exceed these levels by 140 to 300 percent: Type VIII or IX (legend) and Type III or IV (background). After ten years these sheeting types are expected to still exceed FHWA's proposed minimum levels by 140 to 240 percent.

WSDOT has gained experience from installing test overhead guide signs on I-5 in the Olympic Region. The test signs utilize Type VIII or IX sheeting (legend) and Type III sheeting (background) with the sign lights turned off. The combination of these retroreflective sheeting will result in lower maintenance costs, reduced electrical costs, reduce maintenance personnel exposure to traffic, and exceed FHWA minimum sign retroreflectivity levels.

E. Implementation

This change is effective on the date of this supplement and will expire when the changes are incorporated in the *Design Manual*.

These changes apply to *Design Manual* Chapter 820, "Signing" and Chapter 850, "Traffic Control Signals".

II. Instructions

Replace **820.04 (1) *Illumination*** with the following:

The retroreflectivity of currently approved sign sheeting removes the need for providing illumination for most sign installations. Ground-mounted signing, regardless of sign type or message content does not require sign lighting for nighttime legibility. Only overhead-mounted signs with "EXIT ONLY" panels in

non-continuous areas or overhead-mounted guide signs for left side exits in all areas are illuminated. Figure 820-5 identifies the required sheeting for all signs.

The sign lights for existing illuminated overhead and ground-mounted signs can only be de-energized and removed if the retroreflective sheeting is adequate for nighttime legibility. A nighttime assessment of all non-illuminated overhead signs within the project limits is required. Replace all signs with inadequate retroreflectivity. In situations where a non-highway light source interferes with a sign's legibility, consider relocating the sign or providing sign lights.

Flashing beacon signs are used to alert the motorist of an unusual or unexpected driving condition ahead. Sign lights are unnecessary on flashing beacon signs when appropriate sign sheeting, full circle or tunnel signal head visors, and automatic dimmer devices are used, or 8-inch LED flashing beacons.

All other overhead signs are only illuminated when one of the following conditions is present:

- Sign visibility is less than 800 feet due to intervening sight obstructions such as highway structures or roadside features.
- Signs adjacent to other overhead signs having sign lights.

OVERHEAD SIGN TYPE	CONTINUOUS ILLUMINATION OR NON-CONTINUOUS ILLUMINATION	SIGN LIGHTING REQUIRED	SHEETING TYPE - (BACKGROUND)	SHEETING TYPE - (LEGEND & BORDER)
EXIT ONLY - GUIDE SIGN	CONTINUOUS	NO	III OR IV*	VIII OR IX
EXIT ONLY - GUIDE SIGN	NON-CONTINUOUS	YES	II	III OR IV
GUIDE SIGNS FOR LEFT SIDE EXITS	BOTH	YES	II	III OR IV
OTHER GUIDE SIGNS	BOTH	NO	III OR IV	VIII OR IX
REGULATORY SIGNS	BOTH	NO	III OR IV	N/A
WARNING SIGNS	BOTH	NO	VII OR VIII	N/A

Full (Continuous) Illumination is when light standards (luminaries) exist between interchanges.

* - For Yellow Background Sheeting use Type VIII or IX Fluorescent Sheeting

Sign Sheeting Requirements for Overhead Signs

Figure 820-5

Sign illumination is provided with sign lighting fixtures mounted directly below the sign. The light source of the fixture is a 175-watt mercury vapor lamp, or 85-watt induction lamp. Provide one sign light for a sign with a width of 16 feet or less. For wider signs, provide two or more sign lights with a spacing not exceeding 16 feet. If two or more closely spaced signs are in the same vertical plane on the structure, consider the signs as one unit and use a uniform light fixture spacing for the entire width.

Replace **820.04 (2) *Vertical Clearance*** with the following:

The minimum vertical clearance from the roadway surface to the lowest point of an overhead sign assembly with sign light(s) is 17 feet-6 inches. The maximum clearance is 21 feet. The minimum vertical clearance from the roadway surface to the lowest point of an overhead sign assembly without sign light(s) is 19 feet-6 inches. The maximum clearance is 21 feet. For overhead signs mounted underneath bridge structures or inside tunnels contact Headquarters' Traffic Office for additional guidance for vertical clearance requirements.

Replace the second to last sentence for section **850.06 (8) *Signal Display***, with the following:

This warning assembly consists of a W3-3 sign with Type IV reflective sheeting and two continuously flashing beacons.